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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/735,985	12/13/2000	Tihiro Ohkawa	11157.8	5701
7590 03/08/2004				
Neil K. Nydegger, Esq. NYDEGGER & ASSOCIATES 348 Olive Street San Diego, CA 92103		EXAMINER MUTSCHLER, BRIAN L		
		ART UNIT PAPER NUMBER 1753		

DATE MAILED: 03/08/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 09/735,985	<b>Applicant(s)</b> OHKAWA, TIHIRO	
	<b>Examiner</b> Brian L. Mutschler	<b>Art Unit</b> 1753	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
  - If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
  - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
  - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 20 January 2004.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-19 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-16 and 19 is/are rejected.
- 7) ☒ Claim(s) 17 and 18 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Comments***

1. The rejection of claims 2, 3, and 8-11 under 35 U.S.C. 112, second paragraph, has been overcome by Applicant's amendment to the claims.

### ***Claim Objections***

2. Claims 13 and 15 are objected to because of the following informalities:
  - a. In claim 13 at line 7, please change the word "and" following "communication" to --with--.
  - b. In claim 15 at line 5, please insert --solution-- after "electrolyte".
  - c. In claim 15 at line 6, please insert --solution-- after "electrolyte".Appropriate correction is required.

### ***Claim Rejections - 35 USC § 102***

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1, 2, 4, 6, 7 and 12 are rejected under 35 U.S.C. 102(b) as being anticipated by Batha et al. (U.S. Pat. No. 3,930,982).

Regarding claim 1, Batha et al. disclose an electrophoretic/electroosmotic device comprising a conduit having polarized ferroelectric member **21** positioned for interaction

with the solution (fig. 1; col. 3, lines 42-68). Since the ferroelectric member **21** is polarized, it is in a poled state. The device further comprises a means for selectively establishing a potential difference across the conduit (fig. 1). The selective polarization of the electrodes also establishes a potential difference across the conduit and along the fluid pathway (fig. 10).

Regarding claim 2, the device comprises a plurality of electrodes **22** and **23** to selectively polarize the ferroelectric member **21** (fig. 1; col. 4, lines 41-60).

Regarding claim 4, the device has an electrode **22** positioned between a first end of the conduit and a portion of the conduit and a second electrode **23** positioned at least in part between second end and the portion of the conduit (fig. 1). The power source **26** establishes a potential difference between the electrodes via the ferroelectric member **21** (figs. 1 and 6).

Regarding claim 6, the ferroelectric member **21** can be made from materials including barium titanate, barium niobate and strontium niobate (col. 4, lines 1-6).

Regarding claim 7, the device comprises a means for establishing an alternating current that would be capable of de-polarizing the ferroelectric material (fig. 1).

Since Batha et al. teach all of the structural limitations recited in the instant claims, the reference is deemed to be anticipatory.

### ***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 1-14, 16 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO 00/22427, herein referred to as WO '427, in view of Batha et al. (U.S. Pat. No. 3,930,982).

Regarding claim 1, WO '427 discloses a device having a polarizable (conductor) member **6** positioned along a conduit for interaction with a liquid containing positively and negatively charged particles (figs. 1, 2A and 2B). The device also has a voltage means for applying a voltage difference over the longitudinal direction of the conduit (fig. 1; page 2, line 27 to page 3, line 14). When polarized, the conductor **6** is in a poled state.

Regarding claim 2, the device further comprises a second voltage means that selectively polarizes the conductor member **6** to create a voltage difference between the conductor member **6** and the liquid (page 2, line 27 to page 3, line 14).

Regarding claim 3, the polarizing voltage means can be either a direct current or can be alternated and adjusted (page 8, line 31 to page 12, line 21).

Regarding claim 4, the device comprises a first electrode **4** positioned between a first end and a portion of the conduit and a second electrode **5** positioned between a second end and the portion of the conduit (fig. 1); the positions of the electrodes within the conduits are shown in Figures 3 and 4. The voltage between electrodes **4** and **5** is set at a voltage of  $V_1$  (page 8, lines 10-30).

Regarding claim 5, the potential is set to a single voltage,  $V_1$ , which would require a DC current source (page 8, lines 10-30).

Regarding claim 7, the device comprises means for alternating and adjusting the electric field (page 6, lines 21-32).

Regarding claim 8, the device in WO '427 comprises a polarizing electrode that polarizes conducting member **6**, a polarizing voltage source to polarize the member, a first driving electrode **4**, a second driving electrode **5**, and a second voltage source to create an potential difference between the driving electrodes (fig. 1; page 2, line 27 to page 3, line 14). In addition, both voltage means can generate an alternating electric field (page 6, lines 21-32).

Regarding claim 9, WO '427 teaches the separation of the conductive elements from the solution by a thin insulating material (page 10, lines 6-20).

Regarding claims 10 and 11, the first and second alternating voltage sources are "substantially synchronous" (page 6, lines 21-32).

Regarding claim 12, WO '427 teaches a system comprising a conduit formed with a lumen and having a first end and a second end, a polarizable conductor member **17** disposed along the conduit for interaction with a liquid, means for polarizing the conductor member **17**, and means for establishing a potential difference across the portion of the conduit to apply a force on the solution (fig. 3; page 10, line 21 to page 11, line 9). The conductor **17** is in a poled state.

Regarding claim 13, the system comprises a second conduit with a lumen and two ends, wherein one end is connected to an end of the first conduit at a junction (fig.

3; page 10, line 21 to page 11, line 9). The second conduit also has a conductor member **18** disposed along the second conduit (fig. 3). A controller **40** provides means for polarizing the second conductor member **18** (fig. 3). The device also comprises means **20** and **21** to apply a potential difference to apply a force on the solution in the lumen of the second conduit (fig. 3).

Regarding claim 14, the device further comprises a third conduit with a lumen in fluid communication with the junction (fig. 3).

Regarding claim 16, WO '427 discloses a method for manipulating a solution containing ions of opposing polarities. The method provides a polarizable member and placing the member in contact with the solution (fig. 1; page 2, line 27 to page 3, line 14). A first electric field is used to polarize the conductor member to draw one charged species to the surface of the conductor member in a direction perpendicular to the fluid pathway, and a second electric field is used to create a force on the second charged species and create a flow in the direction of the second electric field (figs. 2A and 2B; page 8, line 31 to page 9, line 23).

Regarding claim 19, the electric fields may vary with time and have substantially the same angular frequency (page 6, lines 21-32).

The device and method of WO '427 differs from the instant invention because WO '427 does not disclose the use of a ferroelectric material as the conductor member, as recited in claims 1, 12 and 16. Additionally, WO '427 does not disclose the use of a metal titanate, a metal tantalate, a metal niobate or a metal tungstate, as recited in

claim 6. The conductor member of WO '427 merely requires a material capable of being reversibly polarized.

Batha et al. disclose an electrophoretic/electroosmotic apparatus using polarizable ferroelectric materials, the polarizability of which can "be reversed or reoriented by application of a suitably directed electric field" (col. 3, lines 42-53).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the conductor member of WO '427 to use a ferroelectric material as taught by Batha et al. because Batha et al. teaches that ferroelectric materials are polarizable and the polarization can be reversed or reoriented by suitable electric fields, thus meeting the criteria set forth by WO '427.

7. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over WO 00/22427 in view of Batha et al. (U.S. Pat. No. 3,930,982), as applied above to claims 1-14, 16 and 19, and further in view of Herrick et al. (U.S. Pat. No. 5,282,942).

WO '427 and Batha et al. describe a device and method having the limitations recited in claims 1-14, 16 and 19 of the instant invention, as explained above in section 6. WO '427 does not show the source of the solution.

The device described by WO '427 and Batha et al. differs from the instant invention because they do not disclose the use of reservoirs attached to the first and second conduits, as recited in claim 15.

Herrick et al. disclose an electrophoretic/electroosmotic device having a conductive element disposed along the conduit and means for providing a force along



the conduit (fig. 1). The conduit has reservoirs connected to the end to provide a source and collection container for the conduit (fig. 1).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the device of WO '427 and Batha et al. to use reservoirs as taught by Herrick et al. because reservoirs provide a source and outlet for the solution passing through the conduit.

### ***Allowable Subject Matter***

8. Claims 17 and 18 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

9. Claims 17 and 18 are distinguished over the prior art of record because they provide a use for ferroelectric materials in electroosmotic devices neither taught nor suggested by the prior art of record. While Batha et al. suggest the use of ferroelectric materials as conductive members to drive the movement of a solution, the ferroelectric member is not polarized by an electric field that is subsequently removed before establishing a second electric field to drive the solution, as recited in claim 17. Batha et al. do not teach the method of claim 18 where an alternating electric field of decreasing amplitude is used to de-polarize the ferroelectric member to stop the flow of the solution. Batha et al. does not teach the de-polarization of the ferroelectric member. The method of claims 17 and 18 provides steps to control the electroosmotic flow in a conduit that takes advantage of the properties of ferroelectric materials.

### ***Response to Arguments***

10. Applicant's arguments filed January 20, 2004, have been fully considered but they are not persuasive.

11. Regarding the rejection of claims 1, 2, 4, 6, 7, and 12 over Batha et al., Applicant argues, "[T]he invention disclosed by Batha is neither a pump nor a device for manipulating a fluid" (see page 10 of Applicant's response). This argument is not persuasive because Batha et al. teaches: "If the particles are placed between two oppositely charged electrodes which produce a non-uniform field, such as that produced when one electrode is a point or line and the other electrode is a plane, the polarized particles will experience a net force tending to move the particle into the region of higher electric field strength" (US '982 at col. 1, lines 25-32). The purpose of the device of Batha et al. is to move particles, and the generation of electric field would produce the movement of particles. Additionally, it is noted that Applicant is arguing the intended use of the apparatus, which only limits the structure of the apparatus insofar as the apparatus must be capable of performing the intended use. Since Batha et al. teach all of the structural limitations recited in the instant claims, the reference is anticipatory.

12. Regarding the rejection of claims 1-16 and 19 over WO '427 as the primary reference, Applicant argues that the conductors disclosed by WO '427 are not capable of maintaining a poled state without stimulus by an external source (see page 12 of Applicant's response). Examiner agrees with this statement. WO '427 does not teach the use of a ferroelectric material as the conductor. However, WO '427 teaches that the

conductor should be a material that is reversibly polarizable (page 6, lines 21-32).

Batha et al. teach, "A ferroelectric material is a pyroelectric material whose polarization can, as a consequence of the crystallographic structure of the ferroelectric, be reversed or reoriented by application of a suitably directed electric field of sufficient magnitude. Therefore, since Batha et al. teach that ferroelectric materials are reversibly polarizable, as desired in the conductors of WO '427, it would have been obvious to one skilled in the art to use a ferroelectric material for the conductor. The selection of a known material based on its suitability for its intended use supports a *prima facie* obviousness determination. See MPEP § 2144.07.

13. Additionally, it is noted Applicant is relying on a property of ferroelectric materials that does not influence the structure of the apparatus or the broader method claims. Claim 17 has been indicated as containing allowable subject matter because the claim recites a limitation wherein the first electric field is removed before establishing the second electric field, a method that cannot be performed without the properties associated with ferroelectric materials. Since the prior art of record does not teach such a use of ferroelectric material, claim 17 was indicated as containing allowable subject matter. Conversely, the remaining claims do not contain limitations regarding the discontinuous application of an electric field, and are therefore considered anticipated or obvious in light of the teachings of the prior art.

***Conclusion***

14. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

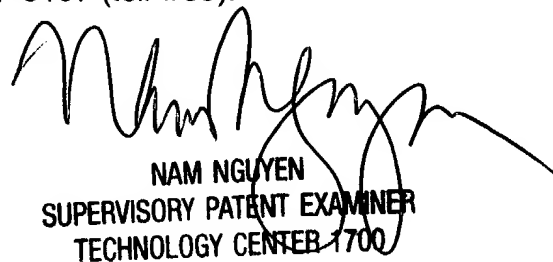
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brian L. Mutschler whose telephone number is (571) 272-1341. The examiner can normally be reached on Monday-Friday from 7:30am to 4:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on (571) 272-1342. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Art Unit: 1753

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

blm  
February 25, 2004



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